



BRIEFING

# Energy efficiency in old buildings







# Points of view

**Glazing in traditional and historic buildings has always been a sensitive area for homeowners, building professionals and conservation bodies. The use of double- and triple-glazing to improve energy efficiency has only heightened the debate. Here the options are considered.**

**First, Chris Wood, head of English Heritage's building conservation and research team, sets out the case for traditional glazing.**

Windows have a profound effect on the appearance of historic buildings and give obvious clues about their history and development. They can also help visually link groups of buildings, particularly terraces. In addition, windows can be important artifacts in their own right, made with as much skill and ingenuity as a piece of antique furniture. Old windows are surprisingly resilient and reflect the age, weathering and movement of a building over the centuries. Although when built they would have been neat and square, over the years many have been adapted to accommodate building settlement or deflections. And so much the better they look. Many coats of paint will have enhanced this somewhat organic appearance. All of this is lost when a window is either replaced or adapted to accommodate double-glazing.

Virtually all historic or traditional windows were single-glazed. To a large extent the design of traditional windows reflects developments in glass production and availability, cost, fashion, and the influence of taxes. Whatever the design, all the component parts had purpose. For example glazing bars, although becoming increasingly slender through the 18th and early 19th centuries, were there to support the individual panes of glass and strength-

en the sash, as well as enhancing the proportions of the individual house or terrace.

Historic handmade window glasses are much thinner and lighter than modern glass. Therefore, it is usually impossible to install double-glazed units - even the 'slim-profile' type - in existing windows without enlarging the glazing rebates. This nearly always involves not only the loss and replacement of the historic plain glazing but the glazing bars, if not the entire sash. Also, because double-glazed units can be four times the weight of the old glass, there is much more wear and tear on moving parts.

It is not uncommon in multi-pane windows for large, individual double-glazed units to be used with glazing bars that are simply stuck on the outside and inside, serving no function. These look most incongruous when viewed close-to, as does the double reflection in the two panes. Handmade glass is a rarity and, where it survives, should always be retained. Crown glass, so redolent of the Georgian era, is especially precious; not just because of its far more interesting lustre and sparkle, but because comparable glass is no longer made today. Is it likely that replacement double-glazed units will perform satisfactorily for 200 years?

Traditional timber windows have proved to have great longevity. Much of this is due to the quality and durability of the timber used;



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**Old glass provides interest and depth to windows.**

**Right: High quality plastic secondary glazing is held in place with magnetic strips.**



even the humble terraced house had windows made from slow-grown Scots pine imported from the Baltic region. This was of a quality virtually unobtainable today. Even though many buildings were not regularly maintained, most of these windows survived, only to be replaced with double-glazing made from plastic, or much inferior timber which is heavily impregnated with preservatives.

Single-glazed windows can be repaired and improved to reduce draughts and retain heat within the room. In the 18th and 19th centuries great use was made of blinds, awnings, shutters and curtains to do this. Recent tests have shown that these same measures can match the thermal performance of double-glazing. Secondary glazing performs even better still. Some of these systems are lightweight and can be removed in the warmer months when two panes of glass are not needed.

Installing double-glazed windows has resulted in the loss of millions of historic windows and their replacement by ill-matching caricatures which can never replicate the originals. Even where traditional windows are retained, their appearance, historic values and functionality are diminished when their glass is replaced with double-glazed units. A high price for an alteration that is unlikely to pay for itself within its service life.

[www.english-heritage.org.uk](http://www.english-heritage.org.uk)

## Secondary glazing

A number of companies now specialise in secondary glazing for old buildings so various options are available. All comprise an extra layer of glass or high quality plastic that fits to the inside of the existing window and, if well designed, this is unobtrusive with modern systems more discreet than those of the past. Units may be made with slim-profile aluminium frames, powder-coated to match internal paint schemes.

Where windows need to be opened, sliding secondary glazing is the answer. For windows that are never opened, or are permanently closed during the winter months, a single secondary glazing panel held in place by magnetic strips is a good option. These systems are easy to install with the magnetic strips fitted around the edge of the glazing while a second magnetic or metal strip is stuck to the window frame so the panel simply drops into place. The strips fixed to the window frame may be painted the same colour as the woodwork so they are inconspicuous when the panel is not in place.

For thermal insulation, the optimum air gap between panes is 20mm. A little ventilation should be maintained through the outer window to prevent condensation on the inner face.

Panels that are removed during the summer are best wrapped and stored under a bed. Even if the panels are not removed for storage, magnetic systems allow the secondary glazing to be easily lifted out for cleaning. Remember that the bigger the window, the heavier and more unwieldy it becomes, making lifting out more difficult; this is where plastic glazing has a definite advantage.

If you measure the window and assemble the panel yourself, this type of glazing is also much cheaper than glass. When ordering secondary glazing bear in mind that careful measurements or a template are essential as old windows are often out of square.





Double glazed panes fitted into an existing window in Edinburgh.

**Calum Duncan, Senior Architect at Malcolm Fraser Architects in Edinburgh, examines the case for double-glazing.**

In considering the place of double-glazing in refurbishment, we should acknowledge that the glazed elements are part of a wider structure, where improvements are also possible, and that there are many ways of improving thermal performance before double-glazing is necessary. In addition, we must give consideration to what remains; retention of original material being the accepted starting point. However, what is extant may vary in quality, authenticity and condition. In the case of catastrophic damage, such as after a fire, nothing remains at all. The detailed nature of a repair or replacement would be considered by our practice in relation to the significance of the historic material and the technical and aesthetic impact of any intervention.

From our experience in Scotland, there appears to be a reasonable view in the approach taken by conservation authorities. There has developed a hierarchy of interventions that allows retention of important elements where they survive, yet deliver the thermal improvement that owners are expecting and sometimes legislation is demanding.

Advances in glazing technology allow many more options in the housing and mounting of glass, especially in their use in multi-pane sash and case windows. This has also allowed the retrofitting of new glass into existing, and sometime historic sashes. In Scotland, where slim-profile double glazed units were first developed, the debate has mainly pondered on the durability of this new type of unit. While durability of the slim-profile double glazed unit has been cited as a reason not to use them, this is a problem of manufacturing and quality control, not one of principle. It is for the industry to resolve these issues and manufacture products that suit the job and the needs of designers.

It should be emphasised that in cases where original glass sur-

vives which has a clear historical value, removal would not be appropriate and less invasive measures may be available. However, across the UK the amount of historic glass in situ is minimal. The replacement of a modern float glass with a newer version of the same technology can hardly be a detriment, if it gives the existing timber of the window an on-going alternative future to removal and replacement.

Where a replacement window is required, it is a straightforward matter to manufacture a new timber sash and case window. It is technically possible to construct this, with current slim-profile double glazed units, to even the thinnest of astragals and traditional patterns and proportions. There might also be a small irony in that, while the sector seeks to preserve examples of innovation in construction techniques of the past, it sometimes inadvertently prevents that story from continuing in the appropriate idiom of timber windows.

Where modern double-glazed timber windows do look wrong, it is generally the fault of the design, not the principle of how such units can be used. In seeking the manufacture of new windows, ironically, it is the smaller joinery workshop that is often more flexible and adept at respecting traditional profiles and proportions than larger scale manufacturers. Larger manufacturers of timber windows seem reluctant to move from oversized styles and heavy margins, possibly for concerns over the perceived movement or distortion of thinner timber sections.

There are also considerable benefits in seeking to ensure that the manufacture of timber windows is a volume activity – this will help keep prices within reach of homeowners and maintain bench and site joinery skills. If this is not done, we risk commoditising the supply chain and making the proper custody of a traditional building feasible for only the well-off or those who can access grants.

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